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AMERICAN ELDER
(*Sambucus canadensis*)

Section 7.5.7, U.S. ARMY CORPS OF ENGINEERS
WILDLIFE RESOURCES MANAGEMENT MANUAL

by

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PREFACE

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NOTE TO READER

This report is designated as Section 7.5.7 in Chapter 7 -- PLANT MATERIALS, Part 7.5 -- WOODY SPECIES, of the U.S. ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL. Each section of the manual is published as a separate Technical Report but is designed for use as a unit of the manual. For best retrieval, this report should be filed according to section number within Chapter 7.

AMERICAN ELDER (*Sambucus canadensis*)

Section 7.5.7, U.S. ARMY CORPS OF ENGINEERS WILDLIFE RESOURCES MANAGEMENT MANUAL

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American elder or elderberry (*Sambucus canadensis*) is a native, deciduous shrub or small tree that usually occurs in moist, fertile soils in open or semi-open areas and along habitat edges. The species is most common in the eastern United States, with scattered populations across the plains states. Of the 12 species of elderberry found in the United States, blue elder (*S. cerulea*), which occurs in the western states and Canada, and American elder are considered to have the most value for wildlife (Coastal Zone Resources Division 1978). Elderberry is beneficial to numerous song and game birds because of its heavy summer fruit production and its proclivity to form thickets that provide valuable nesting, escape, and winter cover (Gill and Healy 1974, Hankla 1977, Coastal Zone Resources Division 1978). It also provides fair escape cover for larger birds and other animals. It is highly recommended as a wildlife food and cover plant for farmland shelterbelts, windbreaks, and woody cover areas and is valued as a wildlife landscaping plant for urban areas (Henderson 1987).

Parts of American elder have been used for a variety of purposes: the dark, juicy berries for making wines, jellies and pies; the flowers for flavoring candies and jellies; the bark for making a black dye; and the leaves, bark and flowers for making a variety of homemade medicinal remedies (Vines 1960). Although the cooked ripe fruit is edible, raw or unripe berries and other plant parts are somewhat toxic (Tull and Miller 1991).

Other common names for American elder include common elder, sweet elder, pie elder, elder-blow and blackberry elder (Vines 1960, Hankla 1977). The genus *Sambucus* is taxonomically placed in the family Caprifoliaceae (Radford et al. 1968).

This report was prepared as a guide to assist biologists and natural resources personnel with the selection, cultivation, and management of plant materials for wildlife and habitat development programs. Major topics covered are description, distribution, habitat requirements, wildlife value, establishment, and cautions and limitations. Wildlife management programs on U.S. Army Corps of Engineers lands should emphasize the use of native plant materials to improve habitat diversity and support a variety of game and nongame wildlife species.

DESCRIPTION

American elder is a deciduous flowering shrub that normally grows 6 to 12 ft (2 to 4 m) tall, but it can grow to 30 ft (9 m) tall and 24 in. (60 cm) in diameter under favorable conditions in the southern portion of its range (Maisenhelder 1955, Vines 1960, Hankla 1977, DeGraaf and Witman 1979). It has been reported as an evergreen in Florida (Cerulean et al. 1986).

The plant is stoloniferous and thicket-forming, with many tightly clustered stems arising from the base (Vines 1960, Radford et al. 1968). The lateral roots form a fibrous, shallow system (Hightshoe 1988). The leggy, upright stems spread and eventually arch to form the shrub's elliptical to round shape. Main stems are thinly woody, with a large white pith. Bark is light brown, yellowish brown, or grayish brown and dotted with prominent cork-like lenticels (Hankla 1977, DeGraff and Witman 1979, Foote and Jones 1989). Smaller lateral branches have dark green bark and are nearly herbaceous, usually dying back in the winter (Coastal Zone Resources Division 1978, DeGraff and Witman 1979). Buds are medium-sized, conical and somewhat depressed (Harlow 1954).

The opposite, pinnately compound leaves have 5 to 11 (usually 7) bright- to medium-green leaflets 4 to 12 in. (10 to 30 cm) long (Vines 1960). The margins are finely toothed, and the lower leaflets are occasionally divided into 3 segments (Foote and Jones 1989). Leaflets are lanceolate to ovate in shape, rounded to wedge-shaped at the base and tapering to the pointed tips, 2.75 to 6 in. (6 to 15 cm) long and 0.75 to 2.4 in. (2.5 to 6 cm) wide (Vines 1960, Radford et al. 1968, Hankla 1977, DeGraaf and Witman 1979). The upper leaf surface is lustrous and smooth; the lower surface is paler and barely or copiously pubescent. Petioles are 1.2 to 4 in. (3 to 10 cm) long and may be naked or pubescent (Vines 1960, Radford et al. 1968, Foote and Jones 1989).

The showy white flowers and dark purple fruits, both borne in umbrella-shaped clusters, are outstanding seasonal features of American elder (Maisenhelder 1955) (Fig. 1). The 0.25-in. (6.3-mm), star-shaped flowers are creamy to white and clustered in terminal convex or flattened cymes 2 to 10 in. (5 to 25 cm) in diameter (Vines 1960, DeGraaf and Witman 1979, Hightshoe 1988, Foote and Jones 1989). Stalked glands may be present in the forks of the cymes (Radford et al. 1968).

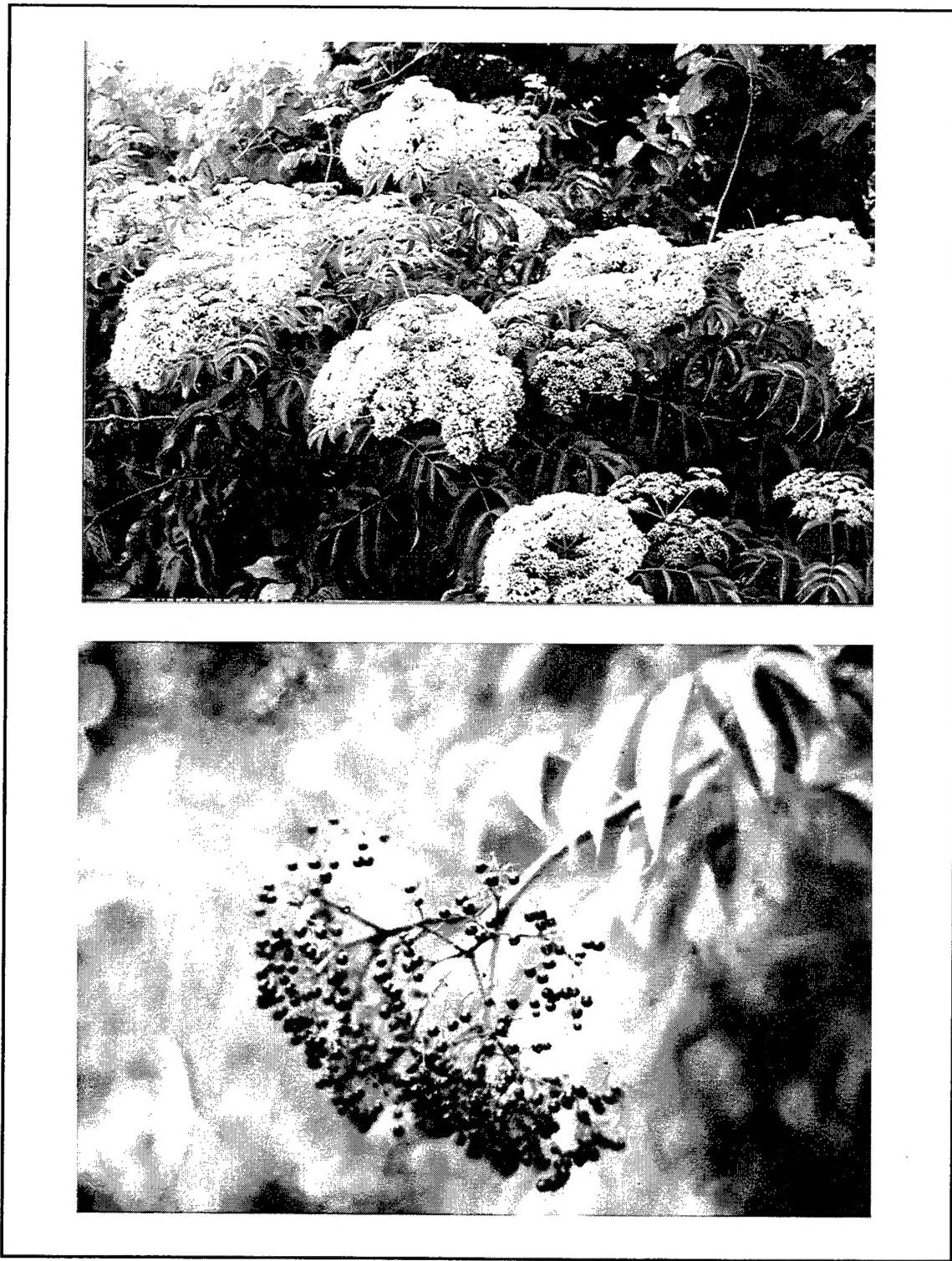


Figure 1. American elder (*Sambucus canadensis*), showing cluster of white flowers in early June (top) and dark purple drupes in August (bottom); photo taken in Vicksburg, MS

Radford et al. (1968) state that flowers bloom from late April through July. However, the flowering period in the South and Northeast may extend from June through August (Maisenhelder 1955, DeGraaf and Witman 1979), and flowers may occur sporadically throughout the fall (Hightshoe 1988).

The fruit is a smooth purple-black berry, 0.16 to 0.24 in. (4 to 6 mm) in diameter, with 4 oblong, tan to yellowish seeds (Radford et al. 1968). The berries are borne on red to purple stems in broad, drooping clusters (Radford et al. 1968, Foote and Jones 1989) that ripen from July through September (Coastal Zone Resources Division 1978, DeGraaf and Witman 1979, Hightshoe 1988). Year-round fruiting has been reported in Florida (Cerulean et al. 1986).

There are numerous horticultural forms and varieties of American elder. Bailey and Bailey (1976) list as cultivars *acutiloba*, *dissecta*, and *laciniata*, all of which have dissected leaflets; *aurea*, with golden yellow leaves and red fruit; *chlorocarpa*, with pale gold leaves and greenish fruit; and *maxima*, a larger form with cymes to 15 in. (38 cm) across. *Sambucus c. rubra*, a form with bright red fruit, is listed as a variety by Vines (1960) and Hightshoe (1988), and *S. c. submollis*, with grayish green, softly pubescent leaves, is listed as a variety by Vines (1960) and Bailey and Bailey (1976).

Elderberry is sometimes planted as an ornamental across its range, and several cultivars with large flower and fruit clusters have been developed. Among these are Adams #1, Egyoff, Johns, Kent, Nova, Scotia, and York (Bailey and Bailey 1976). Johns has been noted as a more vigorous grower with later ripening fruit (Mooberry and Scott 1980). In the Midwest, Nova and Adams #1 are recommended for both landscaping and wildlife benefits, although they are not as hardy in the northernmost portion of the range as naturally occurring elderberry (Henderson 1987). Cultivars are generally available from commercial nurseries.

DISTRIBUTION

American elder is native east of the Rocky Mountains in the United States and Canada. It ranges from Nova Scotia south to Florida and west to Manitoba and Texas (Foote and Jones 1989). It is commonly found throughout the mountain, piedmont, and coastal plain regions of the Southeast (Foote and Jones 1989).

HABITAT REQUIREMENTS

American elder tolerates a wide variety of climatic conditions, withstanding winter temperatures of -40° to -35° F (-40° to -37° C) in the northernmost part of its range to summer temperatures of more than 100° F (37.8° C) in the southern portion (U.S. Department of the Interior 1970). The

species occurs in a variety of habitats from low bottomlands to high mountain elevations (DeGraaf and Witman 1979). Elder is most often found on open or semi-open sites with fertile, moist soils, such as stream edges, fencerows, old fields, pastures, disturbed sites, swamps, bogs, and roadsides; however, it also occurs in alluvial forests and upland woods (Vines 1960, Radford et al. 1968, Hankla 1977, Foote and Jones 1989) (Fig. 2).

American elder is a common species of southern bottomland hardwood forests, where it grows in seasonally to intermittently flooded forests and in transition zones grading from wetland to upland sites (Conner et al. 1990). On its wettest sites, elderberry is associated with sugarberry (*Celtis laevigata*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*), and Nuttall oak (*Quercus nuttallii*). In the highest and best-drained areas of a floodplain forest, elderberry is found with water oak (*Q. nigra*), American beech (*Fagus grandifolia*), and hickories (*Carya* spp.); on slightly drier sites, it occurs with loblolly pine (*Pinus taeda*) and live oak (*Q. virginiana*). In wetland-to-upland transition zones, elderberry occurs with trees intolerant of saturated soils, including several species of oak, ash, and hickory (Conner et al. 1990, Taylor et al. 1990). Elderberry is frequently found in young pine plantations in Mississippi where, depending on site preparation and management, it can constitute a major portion of the woody forage component of that habitat (Campo and Hurst 1980, Hurst and Warren 1982).

Soils

American elder thrives in fertile soils but will grow in sandy and bottomland soils, heavy clays, peats, and muck (Coastal Zones Resources Division 1978). The species is reported to tolerate a pH range of 5.5 to 7.5, with a range of 5.5 to 6.0 recommended for optimal growth (Coastal Zone Resources Division 1978, Hightshoe 1988).

Moisture

Elderberry is adapted to a wide variety of soil-moisture combinations but generally prefers moist, well-drained sites (Vines 1960, DeGraaf and Witman 1979). It can tolerate very poor to excessive drainage and very wet to drought conditions (Coastal Zone Resources Division 1978, Hightshoe 1988).

Shade

American elder prefers full sun but may occur on sites with up to 66% shade (Coastal Zone Resources Division 1978). Henderson (1987) and Hightshoe (1988) have reported that the species will tolerate full shade in landscape plantings, but Hankla (1977) states that it is common in the forest understory only where canopy conditions allow some direct light to reach that forest level.



Figure 2. American elder along forest edge (top) and fence row adjacent to agricultural area (bottom)

WILDLIFE VALUE

American elder is rated as a good-to-excellent wildlife plant, providing food and/or cover for as many as 79 wildlife species (Dove et al. 1985, Henderson 1987) (Table 1). It is considered high in food value (primarily because of the fruit) and medium in cover value (Coastal Zone Resources Division 1978). In most parts of the range, berries are available in summer and fall, and foliage is present from spring until frost.

Food Value

The fruit of elder is usually eaten as soon as it ripens; therefore, elderberry is generally unavailable as a winter food source in most portions of its range (Dove et al. 1985, Henderson 1987). Numerous bird species are reported to eat elder berries in the summer and early fall (Martin et al. 1951, Vines 1960, Dillon 1981); these include robins, mockingbirds, and catbirds, which consume the fruits even before they ripen (Hankla 1977). The fruit is considered to be a choice food of other songbirds, such as the eastern bluebird, cardinal, yellow-breasted chat, rose-breasted grosbeak, blue jay, yellow-bellied sapsucker, white-throated sparrow, starling, brown thrasher, gray-cheeked thrush, Swainson's thrush, wood thrush, rufous-sided towhee, veery, cedar waxwing, red-bellied woodpecker, and red-headed woodpecker (Davison 1967). Game birds that utilize the berries include the wild turkey, ring-necked pheasant, mourning dove, ruffed grouse, and northern bobwhite (Hankla 1977, Coastal Zone Resources Division 1978).

Table 1
Bird Species Reported to Use American Elder

<u>Songbirds</u>	<u>Food</u>	<u>Cover</u>
Eastern bluebird (<i>Sialia sialis</i>)	* ¹	X ²
Northern cardinal (<i>Cardinalis cardinalis</i>)	*	X
Gray catbird (<i>Dumetella carolinensis</i>)	*	X
Yellow-breasted chat (<i>Icteria virens</i>)	*	X
Rose-breasted grosbeak (<i>Pheucticus ludovicianus</i>)	*	X
Blue jay (<i>Cyanocitta cristata</i>)	*	
Northern mockingbird (<i>Mimus polyglottos</i>)	*	X

(Continued)

Sources: Martin et al. (1951), Davison (1967), Halls (1977), DeGraff and Witman (1979), Foote and Jones (1989).

¹ * = fruit is preferred food.

² X = use documented.

Table 1 (Concluded)

<u>Songbirds</u> (Concluded)	Food	Cover
American robin (<i>Turdus migratorius</i>)	*	
Yellow-bellied sapsucker (<i>Sphyrapicus varius</i>)	*	
White-throated sparrow (<i>Zonotrichia albicollis</i>)	*	X
Chipping sparrow (<i>Spizella passerina</i>)	X	X
Song sparrow (<i>Melospiza melodia</i>)	X	X
European starling (<i>Sturnus vulgaris</i>)	*	
Brown thrasher (<i>Toxostoma rufum</i>)	*	X
Gray-cheeked thrush (<i>Catharus minimus</i>)	*	X
Swainson's thrush (<i>C. ustulatus</i>)	*	X
Hermit thrush (<i>C. guttatus</i>)	X	X
Wood thrush (<i>Hylocichla mustelina</i>)	*	X
Rufous-sided towhee (<i>Pipilo erythrrophthalmus</i>)	*	X
Veery (<i>Catharus fuscescens</i>)	*	
Cedar waxwing (<i>Bombycilla cedrorum</i>)	*	X
Red-bellied woodpecker (<i>Melanerpes carolinus</i>)	*	X
Red-headed woodpecker (<i>M. erythrocephalus</i>)	*	X
Yellow-shafted flicker (<i>Colaptes auratus</i>)	X	X
Great crested flycatcher (<i>Myiarchus crinitus</i>)	X	
Alder flycatcher (<i>Empidonax alnorum</i>)	X	X
Common grackle (<i>Quiscalus quiscula</i>)	X	X
Eastern kingbird (<i>Tyrannus tyrannus</i>)	X	
Yellow warbler (<i>Dendroica petechia</i>)		X
Indigo bunting (<i>Passerina cyanea</i>)	X	X
American goldfinch (<i>Carduelis tristis</i>)		X
Yellow-breasted chat (<i>Icteria virens</i>)	X	
Purple finch (<i>Carpodacus purpureus</i>)	X	
Scarlet tanager (<i>Piranga olivacea</i>)	X	
Tufted titmouse (<i>Parus bicolor</i>)	X	
Red-eyed vireo (<i>Vireo olivaceus</i>)	X	
Warbling vireo (<i>V. gilvus</i>)	X	
White-eyed vireo (<i>V. griseus</i>)	X	
White-breasted nuthatch (<i>Sitta carolinensis</i>)	X	
Ruby-crowned kinglet (<i>Regulus calendula</i>)	X	

Game Birds

Wild turkey (<i>Meleagris gallopavo</i>)	X	X
Ring-necked pheasant (<i>Phasianus colchicus</i>)	X	X
Mourning dove (<i>Zenaida macroura</i>)	X	
Ruffed grouse (<i>Bonasa umbellus</i>)		X
Northern bobwhite (<i>Colinus virginianus</i>)	X	X

Numerous mice and rats, raccoons (*Procyon lotor*), opossums (*Didelphis virginiana*), and chipmunks (*Tamias* spp.) feed on the berries, while squirrels (*Sciurus* spp.), rabbits (*Sylvilagus* spp.), and woodchucks (*Marmota monax*) eat both berries and bark. It is likely that the gray fox (*Urocyon cinereoargenteus*) eats the berries, since fruits and other plant materials are a significant part of its diet. Elder berries are important summer foods for the endangered Louisiana black bear (*Ursus americanus luteolus*) in the bottomland hardwood forests of Mississippi and Louisiana (Black Bear Conservation Commission 1992).

White-tailed deer (*Odocoileus virginianus*) will utilize elder berries, foliage, twigs, and bark (Martin et al. 1951, Vines 1960, Hankla 1977, Payne and Copes 1988). Hankla (1961) reported that deer preference for American elder varied from low to medium and that the plant was more readily eaten in the northern part of its range (West Virginia, Pennsylvania, Wisconsin, and New York) than in the southern states. However, regular fall deer use was reported in Louisiana and the piedmont region of Georgia, even when honeysuckles (*Lonicera* spp.) and greenbriers (*Smilax* spp.) were abundant.

American elder attracts butterflies throughout its range (Bir 1992). The flowers are rated as a good source of nectar in the Midwest (Henderson 1987).

Nutritional Value

Although the chemical composition of a plant will vary according to season, location, and management, relative nutritional values can be used as a guide in evaluating the contribution of a plant species to wildlife nutrition. The relative nutritional value of elder berries is considered moderate for crude protein (11.7%) and high for crude fat (16.0%) and phosphorus (0.75%) (Schopmeyer 1974, Short and Epps 1976, Halls 1977). Halls (1977) listed calcium contents of 0.13% and 0.36% (low and medium value, respectively) from the literature. Hankla (1961) reported crude protein levels of American elder leaves, stems, and fruits in North Carolina and Louisiana to be 18%, 7%, and 14%, respectively, higher than the crude protein levels of most deer browse. Elderberry produces 175,000 to 468,000 seeds per pound (79,380 to 212,285 seeds per kilogram) (Vines 1960) and averages 232,000 seeds per pound (105,235 seeds per kilogram) (Halls 1977).

ESTABLISHMENT

American elder is a good plant species to use for wildlife habitat improvement and is considered one of the best low (1 to 10 ft, 0.3 to 3 m), summer-fruiting shrubs for wildlife (Dawson and Decker 1979, Henderson 1987). Easily established, it can be planted singly or in numbers to form thickets and hedges and can be used in a variety of habitat settings. Sensitivity to salt may prevent its use in some locations (Hightshoe 1988). Elderberry withstands urban conditions fairly well (DeGraff and

Witman 1979) and, with some maintenance to control its spread, is well adapted for use in backyards with limited space (Henderson 1987). In addition to its values for wildlife, American elder is an attractive landscaping plant. It is highly ornamental when in bloom and is useful as a tall background plant in wet areas (DeGraaf and Witman 1979, Penn 1982).

In the Midwest, American elder is considered to be a highly desirable species for establishing in shelterbelts and woody cover areas on farmlands. For these purposes, elder is recommended as one of the best species for providing summer wildlife benefits. Shelterbelts or windbreaks are L-shaped rows of trees and shrubs planted around farm buildings or agricultural areas for protection from drifting snow and hot summer winds. These plantings offer valuable nesting, escape, and winter cover for wildlife and provide food when wildlife-preferred plants, such as American elder, are included in the planting (Henderson 1987, Cable 1991).

Several species of mammals are dependent on windbreaks in agricultural areas, including the eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), and white-footed mouse (*Peromyscus leucopus*). As many as 108 species of birds have been found to use windbreaks, with some 66 species receiving substantial or moderate benefits from that habitat (Cable 1991).

Woody cover areas (rectangular or irregularly shaped blocks of trees and shrubs) can be planted in odd corners or along field edges to provide wildlife benefits (Henderson 1987). Designs, specifications, and plant recommendations for shelterbelt and woody cover area plantings are provided by Henderson (1987) and Pitts and McGuire (1991).

Site Selection

American elder should be established where soil, moisture, and shade requirements are acceptable and where its thicket-forming characteristics are appropriate to the available space and land use. For maximum fruit production, American elder is best planted in locations with full sun and moist soil, such as along roadside ditches, near ponds and streams, and along fencerows (Coastal Zone Resources Division 1978, Foote and Jones 1989).

Site Preparation

Soil analyses should be conducted on potential planting sites, to determine the need for fertilizer and lime amendments. Except in full-scale restoration projects, extensive site preparation and/or vegetation removal is not usually required. The area may be disked or harrowed where large numbers of seedlings are to be planted (e.g., rows of shelterbreaks) and the space, soil, and terrain are appropriate. Beyond the immediate spaces where seedlings are set, large sites should be planted with a shallow-rooted cover crop to prevent erosion, improve water penetration, and limit excessive sun, heat, and wind (Henderson 1987). When only one or a few seedlings will be planted, the size

of the area to be cleared, usually 2 to 4 ft (0.6 to 1.2 m), will depend on the size of seedlings, size of competing vegetation, and site erosion potential.

If herbicides are applied to remove vegetation, spraying should be done in autumn before the seedlings are planted. Growing weeds can be removed in the spring with a pre-emergent or post-emergent herbicide.

Propagules

American elder can be propagated by seed, seedlings, or cuttings, all of which are commercially available (Vines 1960, Coastal Zone Resources Division 1978). Fruits and cuttings can be easily removed from wild plants without injury to the plant (DeGraaf and Witman 1979).

Stem cuttings from vigorous 1-year-old canes may be taken from spring through fall. They should be 10 to 18 in. (25 to 46 cm) long and include 3 sets of opposite buds (Ritter and McKee 1964). Cuttings taken in mid-summer and treated with 0.5% indolebutyric acid powder will root readily (Bir 1992). Fall cuttings should be placed in peat moss, kept at 40° F (4.4° C) through the winter, and transplanted outside in the spring (Mahlstede and Haber 1957, Braun 1961). Cuttings from the spreading stolons can be rooted and transplanted in the spring (Mooberry and Scott 1980). Rooted stolons can be severed from the parent plants in early spring or late fall and, if possible, left in place to establish new root systems. When removed, fragile roots of the new plants should be wrapped in plastic or burlap until replanting.

American elder is easily grown from seeds, and a young plant will bloom in 3 years (Mooberry and Scott 1980). Seeds can be collected by stripping or cutting clusters from the branches as soon as the fruit is ripe (Young and Young 1986). Seeds can be prepared for storage or immediate planting by simply crushing the fruit and drying it or by macerating the seeds with water to remove the pulp before drying. Seeds stored in sealed, airtight containers at cool temperatures will remain viable for several years (Young and Young 1992).

Elderberry seeds vary considerably in germination requirements across the plant's range (Bir 1992). The seeds are difficult to germinate because of the hard seed coats. To speed germination, seeds can be scarified with a 10- to 15-minute soak in concentrated sulfuric acid, washed, and chilled at 36° to 40° F (2.2° to 4.4° C) for 2 months before planting (Heit 1967). Seeds may also be prepared for planting by placing them in moist sand for 90 days at 68° to 86° F (20° to 30° C), followed by 90 days of prechilling at 36° to 40° F (2.2° to 4.4° C) (Bir 1992, Young and Young 1992).

Planting Methods

Treated and untreated seeds should be planted 0.25 in. (6.3 mm) deep at a rate of 35 seeds per 1-ft (30-cm) intervals (Schopmeyer 1974). Seeds may be planted in the spring, or in the late fall if well mulched. Untreated seeds usually will not germinate until the second growing season (Coastal Zone Resources Division 1978, Young and Young 1992).

Larger seedlings should be transplanted as soon as possible after they are obtained, either in the fall or spring. Late fall or early winter are the best planting times in the Southeast since the plants are dormant, and some root growth may occur during the winter (Foote and Jones 1989). Roots of bare-root seedlings should be soaked in water for a couple of hours prior to planting. Planting holes should be approximately twice as wide as the root mass and about 12 in. (30 cm) deeper. Backfill soil can be modified with organic amendments, but there is evidence that native soils are best for long-term plant establishment. Fertilizer should not be added until just before new growth begins to appear in the spring.

Any root covering, such as burlap or plastic, should be removed from balled nursery stock, and the roots should be spread apart (Foote and Jones 1989). Seedlings should be planted at the same depth at which they had been growing. Holes should then be backfilled to the soil line, firmed, and watered thoroughly. An organic mulch (e.g., pine straw or bark, wood chips, or leaves) can be added to aid establishment.

MAINTENANCE

Weed control is vital during the first 3 to 5 years after planting because seedling growth and survival can be increased significantly if root systems are established without weed competition (Henderson 1987). Several methods of weed control are available. Hand and/or mechanical cultivation will accomplish weed control, but may be required as often as 3 to 5 times annually. To avoid root damage, mechanical cultivation should come no closer to the seedlings than 6 to 12 in. (15 to 30 cm) and should go no deeper than 3 in. (7.6 cm). Hand cultivation or herbicide treatment can be used to control weeds near seedlings.

Mowing will control competition for light and space, but weed roots will continue to compete with seedlings for moisture and nutrients. Care must be taken when mowing to avoid seedling stem damage that can provide entry sites for disease and insects. Mowing should be done often enough to keep seedlings clearly visible.

Mulching can be used to control weeds and reduce moisture loss in small plantings. Weeds should be removed, followed by application of a layer of mulch at least 6 to 8 in. (15 to 20 cm) deep (Henderson 1987). Sawdust, tree bark, pine straw, clean ground corn cobs, wood chips, and other

materials can be used as mulch. Straw should be raked away from seedlings in the fall to prevent the occurrence of overwintering rodents capable of girdling the seedlings.

Herbicides can be used with hand and boom sprayers to control weeds on both large and small sites (Henderson 1987). A suitable pre-emergent herbicide (e.g., Princep) and post-emergent herbicide (e.g., Roundup) can be used effectively. Herbicides should be applied only when needed and handled with extreme care. All manufacturer precautions should be followed in use and disposal to avoid water supply contamination and prevent possible injury to humans, domestic animals, fish and wildlife, and desirable plants.

Once established, American elder plants are generally hardy, strong growers that tolerate severe pruning. Plants may be cut back to the ground in early spring before the season's first growth begins; this makes it very suitable for roadside use (Mooberry and Scott 1980, Foote and Jones 1989). Cutting the bushes to the ground every other year will usually keep an elderberry thicket in check (Bir 1992). Annual pruning of the canes improves fruit production (DeGraaf and Witman 1979). Individual canes usually die between the third and fifth year and should be removed. Only 5 or 6 strong, 1-year-old canes and 1 or 2 older canes per runner should be left on the plant at annual pruning.

In managed forests, American elder can be left where it occurs to provide food and shelter for wildlife. However, its spreading growth can prevent the development of tree seedlings desired for their timber potential. In such cases, undesirable plants can be contained with chemical treatment (Maisenhelder 1955).

CAUTIONS AND LIMITATIONS

American elder is relatively disease and insect free (Coastal Zone Resources Division 1978, Mooberry and Scott 1980). Hightshoe (1988) reported occasional leaf spot, powdery mildews, thread blight, cankers, verticillium wilt, and other diseases in landscape use. Infrequent insect problems, none of which are serious, may arise from borers, grape mealybugs, thrips, and potato flea beetles (Hightshoe 1988).

American elder is susceptible to wind and ice damage (Hightshoe 1988) and livestock browsing (Vines 1960). Older growth is considered to have some forage value for cattle (Hankla 1977). Although American elder is sometimes browsed, cattle in certain localities refuse to eat it even under stress conditions (Vines 1960). New growth contains a glucoside that may be fatal to cattle and sheep (Hankla 1977).

LITERATURE CITED

Bailey, L. H., and E. Z. Bailey. 1976. *Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada*. McMillan, New York. 1312 pp.

Bir, R. E. 1992. *Growing and Propagating Showy Native Woody Plants*. Univ. North Carolina Press, Chapel Hill. 192 pp.

Black Bear Conservation Commission. 1992. *Black bear management handbook of Louisiana, Mississippi and east Texas*. Baton Rouge, La. 29 pp.

Braun, E. L. 1961. *The Woody Plants of Ohio*. Ohio State Univ. Press, Columbus.

Cable, T. T. 1991. Windbreaks, wildlife, and hunters. Pages 34-55 In J. E. Rodick and E. G. Bolen, eds. *Wildlife and Habitats in Managed Landscapes: An Overview*. Island Press, Washington, D.C.

Campo, J. J., and G. A. Hurst. 1980. Soft-mast production in young loblolly pine plantations. *Proc. Southeast. Assoc. Fish and Wildl. Agencies* 34:470-475.

Cerulean, S., C. Botha, and D. Legare. 1986. Planting a refuge for wildlife: How to create a backyard habitat for Florida's birds and beasts. *Florida Game and Fresh Water Fish Comm. Nongame Wildl. Program*, Tallahassee. 33 pp.

Coastal Zone Resources Division. 1978. *Handbook for terrestrial wildlife habitat development on dredged material*. Tech. Rep. D-78-37. U.S. Army Eng. Waterways Exp. Sta., Vicksburg, MS. 353 pp.

Conner, W. H., R. T. Huffman, and W. M. Kitchens. 1990. Composition and productivity in bottomland hardwood forest ecosystems: The report of the vegetation workshop. Pages 455-480 In J. G. Gosselink, L. C. Lee, and T. A. Muir, eds. *Ecological Processes and Cumulative Impacts: Illustrated by Bottomland Hardwood Wetland Ecosystems*. Lewis Publ., Chelsea, Mich.

Davison, V. E. 1967. *Attracting Birds: From the Prairies to the Atlantic*. Thomas Y. Crowell Co., New York. 251 pp.

Dawson, C. P., and D. J. Decker. 1979. Planting for wildlife. *Conserv.* 34(1):14-16.

DeGraaf, R. M., and G. M. Witman. 1979. *Trees, Shrubs, and Vines for Attracting Birds*. Univ. Mass. Press, Amherst. 194 pp.

Dillon, O. W. 1981. *Invite birds to your home: Conservation plantings for the Southeast*. USDA Soil Conserv. Serv., Program Aid 1093. 16 pp.

Dove, L. E., T. M. Franklin, and L. W. Adams. 1985. "Plant" wildlife in your yard. *Am. For.* 91(3):13-16.

Foote, L. E., and S. B. Jones. 1989. *Native Shrubs and Woody Vines of the Southeast: Landscaping Uses and Identification*. Timber Press, Portland, Oreg. 199 pp.

Gill, J. D., and W. M. Healy. 1974. Shrubs and vines for northeastern wildlife. USDA For. Serv. Gen. Tech. Rep. NE-9. 180 pp.

Halls, L. K., ed. 1977. Southern fruit-producing woody plants used by wildlife. USDA For. Serv. Gen. Tech. Rep. SO-16. 235 pp.

Hankla, D. J. 1961. American elder. Pages 58-59 In L. K. Halls and T. H. Ripley, eds. Deer browse plants of southern forests. USDA For. Serv., South. For. Exp. Sta., New Orleans, La., and Southeast. For. Exp. Sta., Asheville, N.C. 78 pp.

_____. 1977. American elder/*Sambucus canadensis*. Pages 89-90 In L. K. Halls, ed. Southern fruit-producing woody plants used by wildlife. USDA For. Serv. Gen. Tech. Rep. SO-16. 235 pp.

Harlow, W. M. 1954. Twig Key to the Deciduous Woody Plants of Eastern North America. Fourth ed. Dover Publ., New York. 56 pp.

Heit, C. E. 1967. Propagation from seed. Part 6: Hardiness - A critical factor. Am. Nurseryman 125(10):10-12, 88-96.

Henderson, C. L. 1987. Landscaping for wildlife. Minn. Dep. Nat. Resour., St. Paul. 145 pp.

Hightshoe, G. L. 1988. Native Trees, Shrubs, and Vines for Urban and Rural America: A Planting Design Manual for Environmental Designers. Van Nostrand Reinhold, New York. 819 pp.

Hurst, G. A., and R. C. Warren. 1982. Deer forage in 13-year-old commercially thinned and burned loblolly pine plantations. Proc. Southeast. Fish and Wildl. Agencies 36:420-426.

Mahlstede, J. P., and E. S. Haber. 1957. Plant Propagation. John Wiley and Sons, New York.

Maisenhelder, L. C. 1955. Understory plants of bottomland forests. USDA For. Serv. Occas. Pap. 165. South. For. Exp. Sta., New Orleans, La. 40 pp.

Martin, A. C., H. S. Zim, and A. L. Nelson. 1951. American Wildlife and Plants. Dover Publ., New York. 500 pp.

Mooberry, F. M., and J. H. Scott. 1980. Grow native shrubs in your garden. Brandywine Conserv., Chadds Ford, Pa. 68 pp.

Payne, N. F., and F. Copes. 1988. Wildlife and fisheries habitat improvement handbook. USDA For. Serv. Wildl. and Fish. Adm. Rep. Unpaged.

Penn, C. 1982. Landscaping with Native Plants. John F. Blair, Winston-Salem, N.C. 226 pp.

Pitts, D. E., and W. McGuire. 1991. Wildlife management for Missouri landowners. Mo. Dep. Conserv., Jefferson City. 81 pp.

Radford, A. E., H. E. Ahles, and C. R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. Univ. North Carolina, Chapel Hill. 1183 pp.

Ritter, C. M., and G. W. McKee. 1964. The elderberry, history, classification and culture. Pa. Agric. Exp. Station Bull. 709:21.

Schopmeyer, C. S. 1974. Seeds of the woody plants in the United States. USDA Agric. Handb. No. 450. 883 pp.

Short, H. L., and E. A. Epps, Jr. 1976. Nutrient quality and digestibility of seeds and fruits from southern forests. *J. Wildl. Manage.* 40:283-289.

Taylor, J. R., M. A. Cardamone, and W. J. Mitsch. 1990. Bottomland hardwood forests: Their functions and values. Pages 13-86 In J. G. Gosselink, L. C. Lee, and T. A. Muir, eds. *Ecological Processes and Cumulative Impacts: Illustrated by Bottomland Hardwood Wetland Ecosystems*. Lewis Publ., Chelsea, Mich.

Tull, D., and G. O. Miller. 1991. *A Field Guide to Wildflowers, Trees and Shrubs of Texas*. Gulf Publ. Co., Houston, Tex. 315 pp.

U.S. Department of the Interior. 1970. *The national atlas of the United States of America*. Geological Survey, Washington, D.C. 417 pp.

Vines, R. A. 1960. *Trees, Shrubs, and Vines of the Southwest*. Univ. Tex. Press, Austin. 1104 pp.

Young, J. A., and C. G. Young. 1986. *Collecting, Processing and Germinating Seeds of Wildland Plants*. Timber Press, Portland, Oreg. 236 pp.

_____. 1992. *Seeds of Woody Plants in North America*. Dioscorides Press, Portland, Oreg. 407 pp.

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12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.			12b. DISTRIBUTION CODE		13. ABSTRACT (Maximum 200 words) A plant materials report on American elder (<i>Sambucus canadensis</i>) is provided as Section 7.5.7 of the U.S. Army Corps of Engineers Wildlife Resources Management Manual. The report was prepared as a guide to assist the Corps District or project biologist with the selection, cultivation, and management of suitable plant materials for wildlife and habitat management programs. Major topics covered are description, distribution, habitat requirements, wildlife value, establishment, maintenance, and cautions and limitations.	
American elder (also called elderberry) is a native, deciduous shrub of the eastern United States that usually occurs in moist, fertile soils in open or semi-open areas and along habitat edges. Elderberry is beneficial to numerous song and game birds because of its heavy summer fruit production and the formation of thickets that provide cover for a variety of species. American elder is a good species to establish for wildlife habitat improvement and is considered one of the best short, summer-fruiting shrubs for wildlife. Plants can be established singly or in clumps to form thickets and hedges and can serve as an attractive landscape plant. Information is provided on site selection, site preparation, propagules, planting methods, and maintenance requirements.						
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